

WHAT IS CLAIMED IS:

1. An automatic focusing device for a film scanner having a zoom lens as an imaging lens for projecting an image recorded on photo film onto an image sensor, the device comprising:

- a film type identifier for identifying film type of the photo film;
- a focus-scan range definer for defining a focus-scan range in accordance with the identified film type;
- a sampler for sampling pixel signals from the image sensor at different focusing positions within the focus-scan range of the imaging lens;
- a band pass filter for producing evaluation signals from the pixel signals, the evaluation signals being correlative with spatial frequencies of the image, and for extracting those evaluation signals within a given frequency band, the band pass filter being constituted of programmable digital filters such that the frequency band is modified in cooperation with zooming of the imaging lens;
- an integrator for obtaining an integration value of the extracted evaluation signals at one focusing position; and
- a controller for controlling the focusing position of the imaging lens based on the integration values obtained at different focusing positions.

2. An automatic focusing device for a film scanner having a zoom lens as an imaging lens for projecting an image recorded on photo film onto an image sensor, the device comprising:

a lens driving mechanism for changing focusing position or zooming position of the imaging lens;

a lens position detector for detecting focusing position and zooming position of the imaging lens;

a film type identifier for identifying film type of the photo film;

a focus-scan range definer for defining a focus-scan range in accordance with the identified film type;

a sampler for sampling pixel signals from the image sensor at different focusing positions within the focus-scan range of the imaging lens;

a band pass filter for producing evaluation signals from the pixel signals, the evaluation signals being correlative with spatial frequencies of the image, and for extracting those evaluation signals within a given frequency band, the band pass filter being constituted of programmable digital filters such that the frequency band is adjustable;

a data memory storing set values for the frequency band of the band pass filter with reference to the data memory in accordance with the zooming position detected by the lens position detecting means;

an integrator for obtaining an integration value of the evaluation signals at each sampling interval;

a peak detector for detecting a peak value of the integration values obtained at the different focusing positions; and

a controller for controlling the lens driving mechanism to set the imaging lens at a focusing position where the peak value is obtained.

3. An automatic focusing device as claimed in claim 1, further comprising a motor for moving the imaging lens to the different focusing positions, and a motor driver for driving the motor at different speeds depending upon the film type.

4. An automatic focusing device as claimed in claim 2, wherein the lens driving mechanism changes the focusing position or zooming position of the imaging lens at different speeds depending upon the film type.

5. An automatic focusing device for a film scanner, the automatic focusing device comprising:

an imaging lens for projecting an image recorded on a photo film onto an image sensor, the imaging lens including a zooming lens;

a frame size designator for designating an effective image area on the photo film based on at least one of a user input and information recorded on the photo film;

an evaluation area definer for defining an evaluation area on the image sensor in accordance with the designated effective image area;

a sampler for sampling pixel signals from the image sensor at different focusing positions of the imaging lens, said sampler further including

a film type identifier for identifying film type of the photo film,
and

a focus-scan range definer for defining a focus-scan range in accordance with the identified film type, wherein the different focusing

positions at which pixel signals are sampled are within the focus-scan range;

an evaluation signals producer for producing evaluation signals from the pixel signals obtained from the evaluation area, the evaluation signals being correlative with spatial frequencies of the effective image area;

an integrator for obtaining an integration value of the evaluation signals at one focusing position;

a controller for controlling the focusing position of the imaging lens based on the integration values obtained at the different focusing positions; and

a zooming position detector for detecting a position of the zooming lens, wherein the evaluation area definer defines the evaluation area in accordance with the effective imaging area and the position of the zooming lens.

6. An automatic focusing device as claimed in claim 5, further comprising a motor for moving the imaging lens to the different focusing positions, and a motor driver for driving the motor at different speeds depending upon the film type.

7. An automatic focusing device as claimed in claim 5, further comprising:

a first table memory storing data of evaluation areas to be defined in relation to predetermined effective image areas;

a second table memory storing data of focus-scan ranges to be defined in accordance with the film type; and

a third table memory storing offset amounts of the focusing lens in relation to zooming positions of the zooming lens,

wherein the start point and the terminal point of the focus-scan range are shifted in accordance with an offset amount of the focusing lens determined with reference to the third table memory in accordance with the detected zooming position.

8. An automatic focusing device as claimed in claim 7, wherein the first table memory allocates one evaluation area to each combination of one effective image area and one zooming position, so that the evaluation area is determined by the designated effective image area in combination with the detected zooming position.